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Control of Eel-Grass in Oyster Culture Areas

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A dense growth of eel-grass **Zostera marina L.** often interferes with oyster culture in the shallow areas of warm summer water in the Maritime Provinces. Eel-grass thrives best in water which reaches a temperature of 60° to 80° F. (15° to 25° C. approx.) in summer and where the plants are not exposed at all, or for no more than short periods at low tide, but not covered more than about ten feet at high tide. The plant occupies a range of bottom types from soft mud to hard sand and gravel, but it becomes established in shifting sand only with difficulty. Heavy wave action or strong currents reduce its ability to establish itself.

The chief disadvantage of eel-grass in an oyster-growing area is the great difficulty it makes in fishing the oysters, fouling tongs and drags and causing the latter often to ride over the oysters. It appears that in some areas a heavy growth of eel-grass together with the covering of oysters by the dead leaves may seriously reduce water circulation close to the oysters and thus their normal active growth. However, it is doubtful if the presence of a moderately heavy growth of eel-grass will seriously affect the growth of oysters; other bottom conditions such as water movement, silting and softness of bottom are equally or more important. Well shaped, good oysters develop in places where eel-grass grows on firm, sandy-mud bottom, but, whether or not eel-grass is present, mis-shapen poor oysters occur in soft, muddy bottom where excessive silting occurs. Eel-grass does, in fact, provide a beneficial stabilizing influence in some areas by reducing active movement of sand bottom exposed to wave action.

Past attempts at control of eel-grass by oyster growers consisted of cutting the plants and also of covering areas of dense growth with boards and sand. In studies made by the Fisheries Research Board two methods have been found to give extended control of eel-grass: covering in various ways, and chemical treatment. Cutting the plants is only a temporary measure since new leaves and branches will soon develop unless the growing points are killed.

MECHANICAL REMOVAL OF EEL-GRASS

Much eel-grass can be and is removed by fishing for oysters and a considerable reduction in numbers of plants can be effected by fishing with tongs or oyster drags. Power dragging with an oyster drag greatly reduces the density of eel-grass. The effectiveness is greater if a toothed bar is used at the front of the drag rather than a smooth bar. The removal is more complete from soft bottom than from hard sandy bottom, since whole plants come up from the soft bottom, whereas the root-stocks break easily in the hard bottom because they are more firmly rooted. This method is suited to the spare-time use of a power boat and oyster drag.

Scythes can be used to cut and clear away the eel-grass from shallow-water areas at low tide. Various machines using power-driven sickle-bars have been devised to cut water weeds. Such an apparatus can be used to cut the eel-grass from an area before fishing is commenced. This greatly increases the ease of fishing, but cannot be considered a permanent removal since the plants develop new leaves from their stem growing points, just as does lawn grass. It is likely that a machine of this type, owned co-operatively, might be valuable in making fishing more practicable for a number of leaseholders in an eel-grass-infested area. One such machine now available commercially was tried but was not rugged enough for general use.

CONTROL BY COVERING THE EEL-GRASS

If the eel-grass plants can be covered by 3 to 6 inches of solid material they will be killed. In places where the covering is thinner a few plants may succeed in growing up through it, but if the covering is done carefully these should be few in number and can be removed by hand.

Several different methods have been tried with considerable success; others might be equally effective. Some materials are available at no cost; others must be purchased and prepared. Labour is a considerable item here, and if off-season or spare-time labour can be used the control is much more economical.

I. Shell. Both crushed clam shells from a cannery and oyster shells from the cleaning of old oyster beds have been used with success to get rid of eel-grass from small areas. Cutting the eel-grass makes it easier to spread such material. The area to be treated should be staked out in smaller areas to facilitate even spreading of the shell which can be done from loaded dories

or scows. A depth of 3 to 4 inches of shell should be sufficient to kill the "grass" and prevent any plants from pushing up through. Shell covering is particularly effective if very little silting occurs since the plants do not then root effectively in it. A very slow spread of plants will occur over the edge.

II. Gravel. If moderate-size gravel is available, the majority of particles being greater than one-half inch, it can be applied in the same way and to the same depth as the shell. Experimental plots of both shell and gravel have now lasted satisfactorily for over five years. An even coverage is important here too.

III. Sand. Sand may be used as a covering over cut or uncut plants if sufficient depth (about 6 inches) is used. However, the destruction of the eel-grass is more certain if beach sand is put down over a solid covering such as lapped tarpaper strips. A number of years ago sand over rough lumber platforms was very successful. The control is not permanent because eel-grass seeds will germinate in the sand and gradually new plants will be established. In view of the present price of lumber, the cost would probably be prohibitive for temporary control. The lack of permanence is true of any case where sand cover is used; however, areas treated experimentally with sand over tarpaper have lasted more than four years with only small local reinfestations.

Tarpaper strips which are cheaper than the wooden platforms, can be unrolled on the bottom by a man wading at low tide and can be covered with sand along one edge until the next lapping strip is laid. After the strips are in place more sand can be deposited to a depth of 4 to 6 inches to prevent wave or other damage to the tarpaper. The diagrams indicate the manner in which this can be done (Figs. 1 and 2). In planning such a treatment, low tide and calm weather should be sought. Cutting the eel-grass beforehand would also make the operation easier.

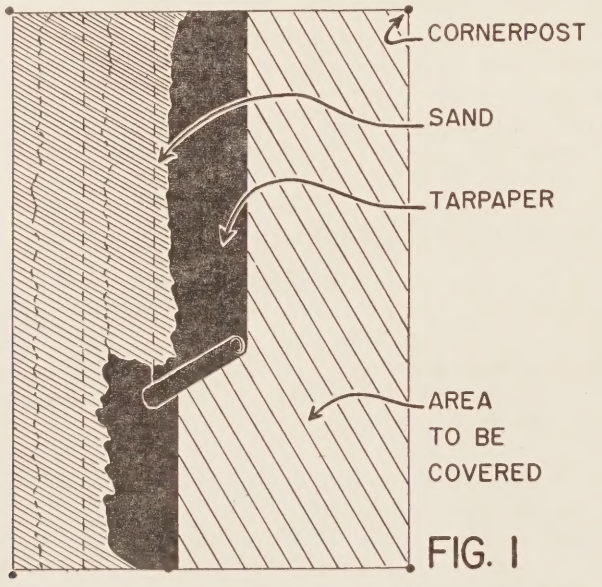

FIG. 1

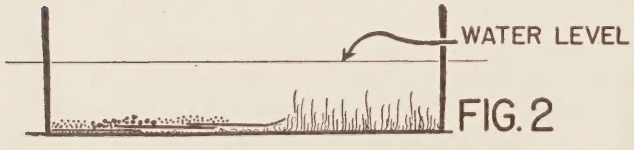

FIG. 2

IV. Concrete. Thin, square slabs of concrete were used in one place to cover the eel-grass and get rid of it successfully. This gives a permanent, hard bottom, very suitable for oyster farming, but is expensive and difficult to lay.

CHEMICAL ERADICATION OF EEL-GRASS

It would be very agreeable to have a simple chemical treatment available which would cheaply and effectively eradicate all the eel-grass in an area. The one chemical tried which was found to be successful was **Benoclor 3.** It is a heavy, oily liquid, almost insoluble in water and consisting of a mixture of chlorinated benzenes. Application at concentrations of one gallon or more per 800 square feet of bottom kills all the eel-grass plants. The liquid, being heavier than the sea water, can be sprayed into the water as a fine suspension of droplets just above the surface of the bottom and will fall to the bottom. Where the droplets come in contact with the surfaces of the plants the chemical is absorbed and this results in the death of the active growing points of the stems and of the underground root-stocks. The upright leaves appear healthy for some time after the growing points have turned from their fresh, crisp, white condition to a soft, olive-coloured state indicative of their death (Fig. 3). After a week or two it will be found that the leafy shoots can be pulled up with ease, breakage occurring at the dead growing point regions. The loss of all the leafy parts is likely to occur with strong wave action leaving the area clear of all but the dead root-stocks. These too will be removed by severe wave action.

The practice which was found to be most successful was to mark out the area for treatment from one end to the other in small areas (about 10 feet square); the markers can be moved farther along to new positions as the first squares are treated. Although spraying can be done, the best coverage of the area was obtained by mixing the Benoclor with clean dry sand in the proportion of one pint per pail of sand (1 gallon to 8 pails). This can be done in a box with shovels or in a cement mixer, in either case adding the liquid little by little as the mixing proceeds. The mixing should not be done more than a few hours before spreading , and if a delay occurs the mix should be covered over since, although the Benoclor does not dissolve in water, it evaporates into the air. The mixing should be continued until the originally dry sand is evenly wetted by the Benoclor.

The spreading is done best with small "shovels" such as those used with coal scuttles. Some practising should be done first with untreated sand to get the knack of spreading the required amount evenly over the area to be covered. This will be one pailful (containing one pint of Benoclor thoroughly mixed with the sand) spread evenly over 100 square feet (10 feet x 10 feet). It is better to cover this small area thinly several times than to attempt to distribute the sand evenly in one covering.

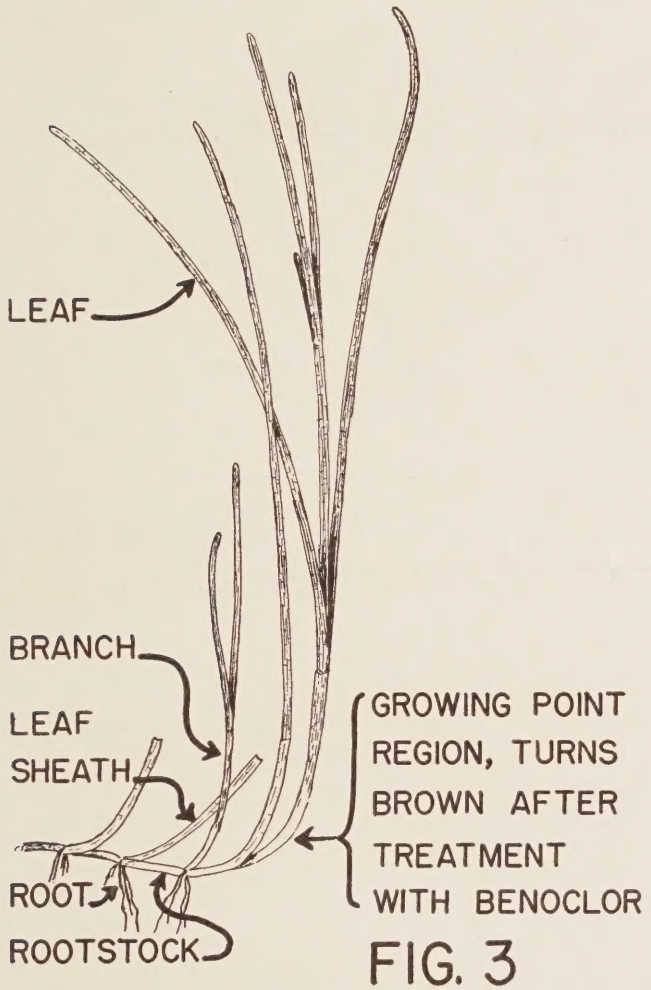

FIG. 3

It is of extreme importance to select the best conditions for spreading before the attempt is made. It should be done: (1) at low tide, for ease of observing the area, (2) when water is nearly calm, and (3) at slack water, since moving water will carry the chemical away from the area for which it was intended. It is not really worth while attempting to use this chemical treatment if a strong current or tidal movement of water occurs over the area, as in river mouths with strong outflow, or close to channels at or near the mouths of bays through which a strong tidal interchange occurs.

If a sprayer is to be used to spread the chemical, it will be advantageous first to make timed trials with water (pour some ink or dye into the water to make it visible) over a measured area to determine how quickly a measured volume of liquid is pumped from the sprayer, and how quickly the nozzle must be moved about to give complete coverage. The method of spraying will depend on the type of sprayer available, but if the "spray" will break up into fine droplets under water it would be best to spray just above the surface of the plants. The same precautions must be observed here as in spreading with sand: (1) coverage must be complete and even, (2) the time of spraying must be chosen when water movements are at a minimum, and when the bottom to be covered can be observed, (3) the total area should be marked out in smaller areas to make even coverage easier.

Benoclor is poisonous to animals, but is unpalatable and irritating and therefore not likely to be ingested. This aspect presents no problem. Prolonged contact with the skin should be avoided because it will cause some irritation and discomfort, but the fluid will wash off with soap and water. It can dissolve or loosen paint. If applied with sand it causes no damage to oysters. If applied as a spray, some droplets may be taken in by the occasional oyster before it closes, but in the recommended concentration little damage is likely. Oysters which were caused to take in Benoclor in large droplets formed blisters around the drops on the inner side of the shell.

Benoclor 3 can be obtained from Arrow Quebec Ltd., 1114 Union Avenue, Montreal, P.Q., and, since its cost fluctuates, it would be best to enquire about the price before planning to use it.

Choice of a method to get rid of eel-grass will depend on the conditions and circumstances.

Further information or advice about the above methods may be obtained by writing to the Director, Atlantic Biological Station, St. Andrews, N.B.